

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



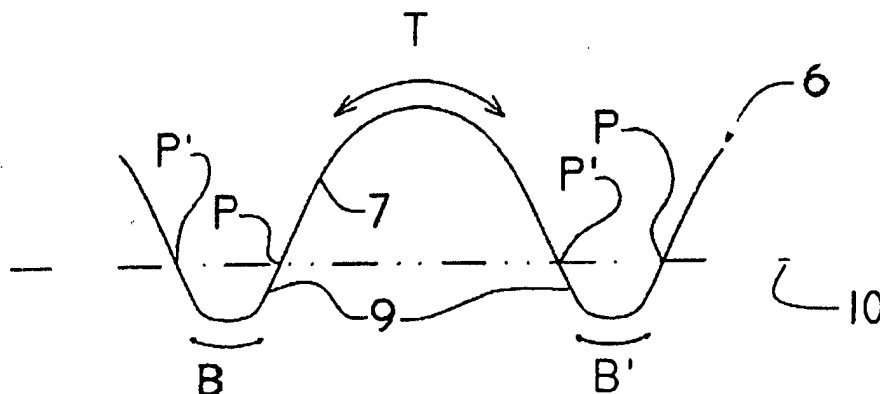
(43) International Publication Date
3 June 2004 (03.06.2004)

PCT

(10) International Publication Number
WO 2004/046594 A2

- (51) International Patent Classification⁷: **F16L** (74) Agent: **BLEUKX CONSULTANCY BVBA**; Rijksweg 237, 3650 Dilsen-Stokkem (BE).
- (21) International Application Number: **PCT/EP2003/013044** (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SK, SL, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date: 17 November 2003 (17.11.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 20025536 18 November 2002 (18.11.2002) NO
- (71) Applicant (*for all designated States except US*): **NORSK HYDRO ASA** [NO/NO]; Bygdøy Allé 2, N-0240 Oslo (NO).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **PETERSEN, Henry** [DK/DE]; Burgstrasse 9, 24939 Flensburg (DE). **OLSEN, Søren, B.** [DK/DE]; Margarethenstrasse 10, 3, 24939 Flensburg (DE). **NIELSEN, Karl, Brian** [DK/DK]; Trekanten 8, DK-9270 Klarup (DK).
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— *without international search report and to be republished upon receipt of that report*
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **A FLEXIBLE, TUBULAR DEVICE E.G. A BELLOWS**



(57) Abstract: The present invention concerns a flexible, tubular device e.g. a bellows with an internal diameter up to 60 millimeters, said device comprising one or more corrugated convolutions (2), said convolutions having an overall bell-like shape with rounded top portions (T) and rounded bottom portions (B,B'). The novel aspects involve that the curvature of the outside surface of the convolutions (2) is numerically smaller at the top portions (T) than at the bottom portions (B,B'), said curvature being derived from a curve (6) defined as the intersection of the outside surface (4) of the device and a plane through the longitudinal axis (8) of the device, as well as they involve that the curvature of said curve changes sign only once at a change position (P,P') located between a top portion (T) and an adjacent bottom portion (B,B'), and that the length of a first section (7) on the curve (6) is at least 10% longer than the length of a second section (9) on the curve, said first section (7) extending from one change position (P) to an adjacent change position (P) via a top portion (T), and said second section (9) extending from one change position (P) to an adjacent change position (P') via a bottom portion (B,B'). This provides an improved design with increased durability due to increased flexibility at

WO 2004/046594 A2